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MP MASTER
MA29866

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INSTRUCTION MANUAL

MEDIUM DUTY AZIMUTH POSITIONER

MODEL PMA-3

SERIAL NO. 73

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MODEL PMA-3

MEDIUM DUTY
AZIMUTH POSITIONER

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I. GENERAL DESCRIPTION

1.1 Introduction

The Model PMA-3 Medium Duty Azimuth Positioner is a rugged weatherproof unit designed for general antenna positioning requirements where light weight and portability are desired.

The Model PMA-3 is equipped with a variable speed dc motor which provides continuous and reversible rotation. A synchro transmitter unit provides 1:1 and 36:1 output signals for remote position indication and recorder chart control.

1.2 Specifications

Maximum Vertical Load	200 pounds
Maximum Bending Moment	200 foot-pounds
Gear Strength Torque	87 foot-pounds
Turntable Diameter	12 inches
Antenna Mounting Slots	six, 4-1/2" to 10-5/8" diameter circle, 3/8" wide, 60° O.C.
Motor	
Horsepower	1/15
Torque	40 foot-pounds
Field Excitation	115 volts dc
Armature	
Voltage Range	0 to 145 volts dc
Maximum Current	0.75 amperes
Speed Range	0.14 to 2.7 rpm
Synchro Type	23TX6
Synchro Output Signals	1:1 and 36:1
Position Accuracy	± 0.05°
Dimensions	
Height	9-9/16 inches
Length	17 inches
Width	10-1/8 inches

Positioner Mounting Holes	four, 13/32" diameter holes 15-1/2" x 8-5/8" O.C.
Inside Diameter, Thru Shaft	3/8"
Net Weight	55 pounds
Shipping Weight	65 pounds
Recommended Scientific-Atlanta Control Unit	Model PC 2-33

II. DETAILED DESCRIPTION

2.1 Mechanical (See Assembly Drawing)

The positioner turntable (5) is a machined aluminum casting provided with antenna mounting slots. It is secured to a "sure grip" bushing (20) which grips the top of the turntable drive shaft (4). The shaft rotates in two precision ball bearings (28 and 29) pressed into the top and bottom of the main bearing housing and is fastened to the final drive gear (7) with key and self-locking nut (21). The final drive pinion is locked on the drive shaft of the speed reducer (15) which is driven by a 1/15 hp reversible dc motor through a timing belt (19).

A synchro transmitter unit (14), which provides accurate position information at ratios of 1:1 and 36:1 with the turntable, is driven by the final drive gear through the synchro transmitter anti-backlash gear (8).

The drive motor, speed reducer, and synchro transmitter unit are bolted to a mounting plate (2) which is fastened to the base plate (1) through spacer bars (9 and 10). These spacer bars hold the mounting plate 1-1/2 inches away from the base plate to provide a housing for the gears.

2.2 Electrical

A schematic diagram of the Model PMA-3 Medium Duty Azimuth Positioner appears in the rear of this manual. The R_1 and R_2 connections of the Type 23TX6 Synchro Transmitters are connected in parallel and require 115 volts, 60 cycles at a total current of 460 milliamperes. The drive motor requires a 115 volt dc field excitation. The speed is varied by varying the armature current between 0 to 0.75 amperes. External connections to the drive motor and synchro transmitter are made through the Type N connector. Instructions for connecting the positioner to the recommended positioner control unit are found in the Model PC 2-33 Instruction Manual.

III. MAINTENANCE

3.1 Cover Removal

The turntable is removed by unscrewing the turntable mounting bolts and screwing them into the adjacent tapped holes. The bolts will push the turntable away from the "sure grip" bushing and permit its removal. The bushing is slipped off the shaft after the pressure has been relieved by wedging a screwdriver in the bushing slot. The water-tight case is then lifted from the base plate after removing the case mounting screws.

3.2 Lubrication

3.2.1 Speed Reducer:

The speed reducer is filled to the correct level with Standard or Esso Pen-o-Led No. 6 or No. 2. Pen-o-Led No. 6 is used for temperatures of 40° to 90° F. Pen-o-Led No. 2 is used for temperatures of 0° to 40° F. For temperatures below 0° F, add one part kerosene to four parts Pen-o-Led No. 2.

Check the speed reducer periodically for leaks. If leakage is indicated, the oil level should be checked. When it becomes necessary to add oil, use the above grades according to prevailing temperature conditions.

3.2.2 Gears:

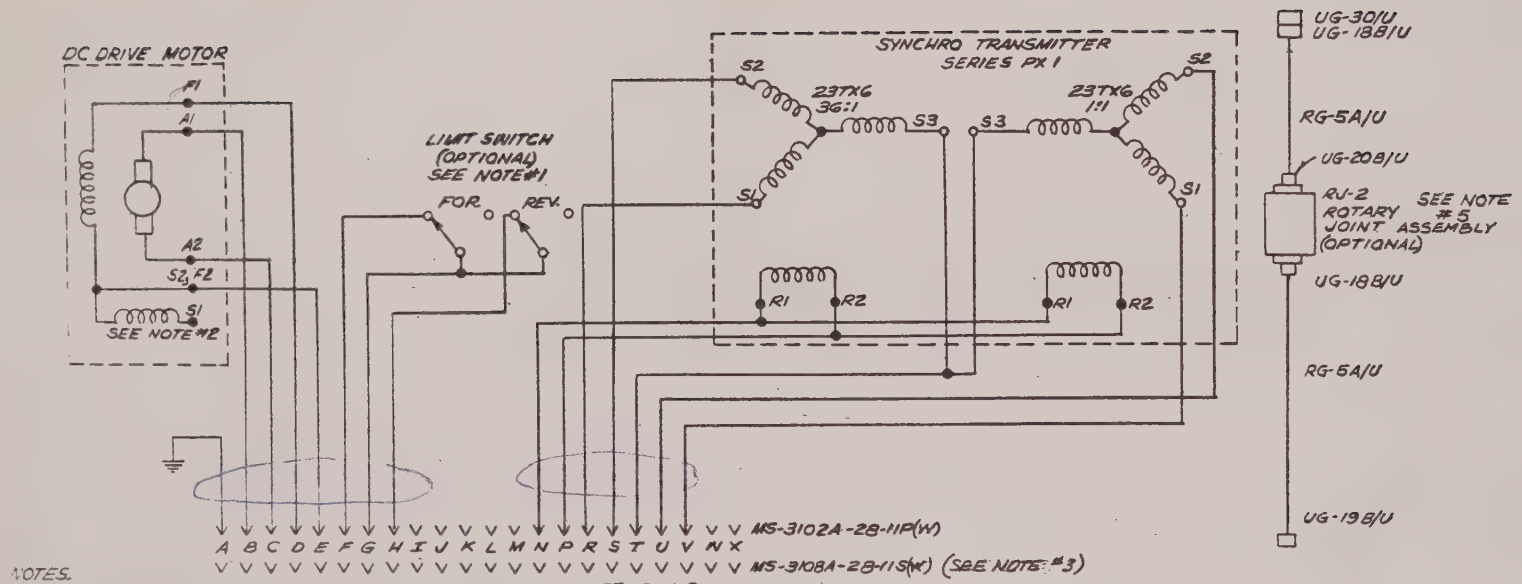
The gears should be greased once a year. Insert the grease through the openings between the spacer bars. Use Fiske Brothers Refining Company Lubriplate No. 630AA, or equivalent.

MODEL PMA-3

MEDIUM DUTY
AZIMUTH POSITIONER

MANUFACTURERS' CODE LETTERS

Code	Manufacturer
ABE	Amphenol-Borg Electronics Corp.
BE	Bodine Electric Company
CM	Cinch Manufacturing Company
ED	Eberhardt-Denver Company
HT	Hudson Tool & Die Company, Inc.
MCC	Morse Chain Company
ND	New Departure Division, General Motors Corporation
RDP	Reed & Prince Manufacturing Co.
RN	Rosan, Inc.
SA	Scientific-Atlanta, Inc.
SPS	Standard Pressed Steel Company
VM	Victor Manufacturing & Gasket Company
WD	Wood's Sons Company, T. B.

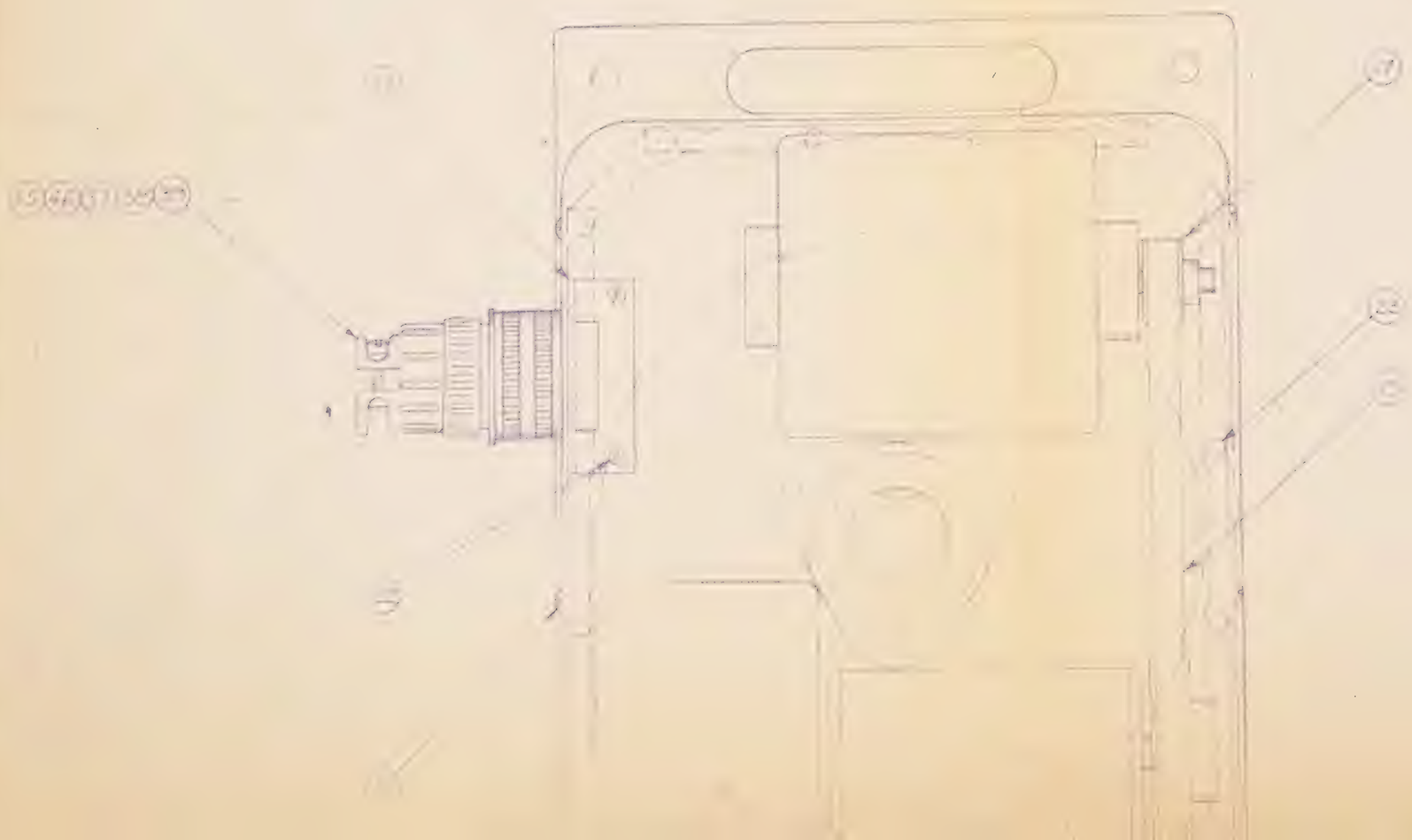


NOTES.
1. LIMIT SWITCHES ARE AVAILABLE ON ALL MODELS EXCEPT PMA 3
2. SERIES WINDING NOT USED (DRIVE MOTOR OPERATED AS SHUNT MOTOR)
3. PMA-3 USES MS 3106A-28-11S(W).
4. SUFFIX "L" INDICATES LIMIT SWITCH INCLUDED
   " "R" " ROTARY JOINT "
5. ROTARY JOINT AVAILABLE ON ALL MODELS EXCEPT PMA 3
6. WHERE THE GEARING OF SYNCHRO TRANSMITTER DRIVE SHAFTS PROVIDE OPPOSITE PHASE SEQUENCE FROM THAT DESIRED, THE S1 & S3 LEADS OF THE INDIVIDUAL SYNCHROS HAVE BEEN REVERSED AT THE CONNECTOR.
7. WHERE THE GEARING OF THE DRIVE MOTOR SYSTEM PROVIDES OPPOSITE ROTATION FROM THAT DESIRED, THE A1 & A2 LEADS OF THE MOTOR & ARMATURE HAVE BEEN REVERSED AT THE MOTOR JUNCTION BOX.

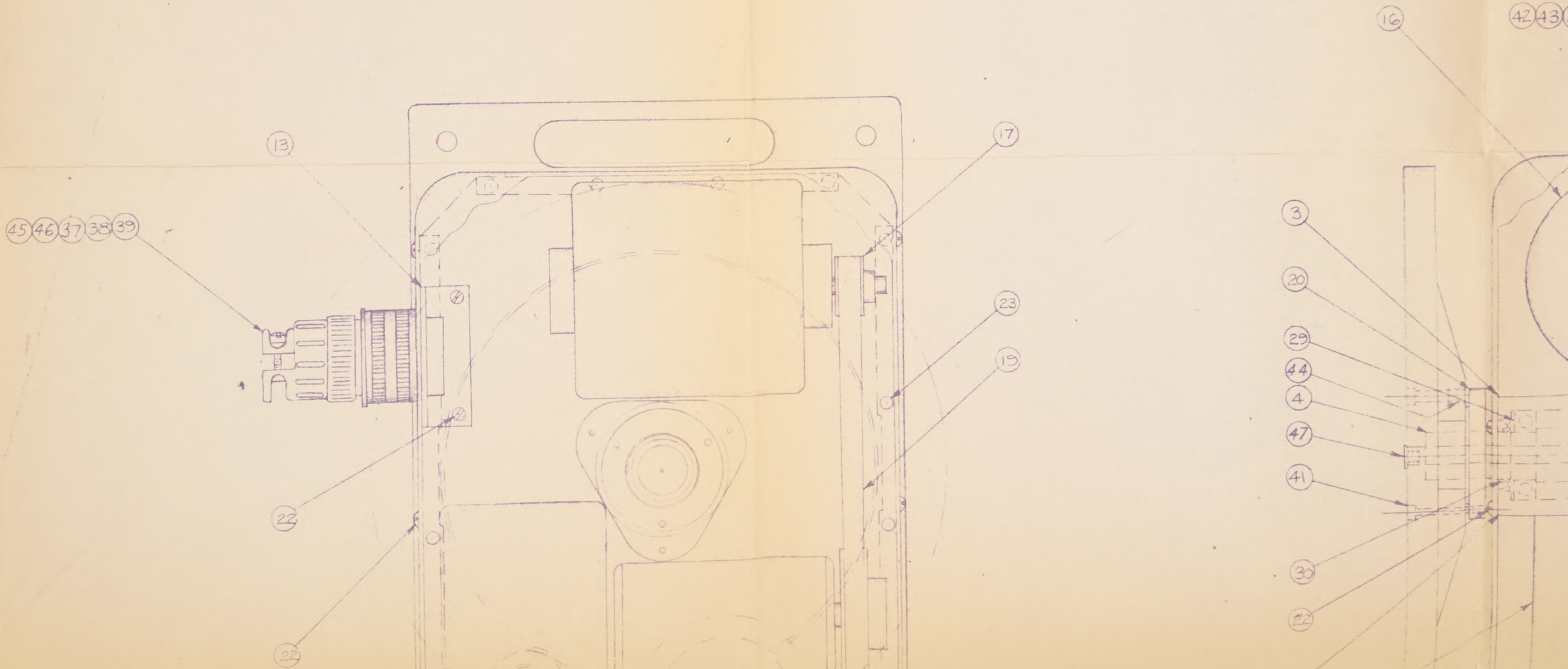
Schematic Diagram of Models PP 13(), PP 23(), PMA 3(), and PMA 5() Positioners

COLOR CODE FOR 150' EXTENSION CABLE (19 CONDUCTOR - 16 GAGE)

PIN #	COLOR	PIN #	COLOR	PIN #	COLOR		
A V	WHITE/RED	F E	GREEN	F R	RED/BLACK	SPARE	BLUE/BLACK
B K	ORANGE/RED	G L	ORANGE	G S	RED	SPARE	ORANGE/BLACK
C	BLUE	H H	BLACK	H T	WHITE	SPARE	GREEN/BLACK
D	WHITE/BLACK	AB N	BLUE/WHITE	D U	BLACK/WHITE	SPARE	BLUE/RED
E M	BLACK/RED	C P	GREEN/WHITE	E V	RED/WHITE		



47	FUSE BUTTON	F-8	CM	1	MICA PL T	FOR $\frac{3}{8}$ HOLE
46	CAP & CHAIN ASSY.	9760-28	ABE	1		
45	RECEPTACLE GASKET	STD-MA-2611	SA	1	NEOPRENE	$\frac{1}{16}$ x 2 x 2
44	MICA & WASHER	AGE-MB-SC-8	RN	3	CAD PL ST	$\frac{1}{8}$ x $\frac{3}{8}$ x $\frac{3}{8}$
43	WASHER-FLAT	SAE		4	CAD PL ST	$\frac{1}{4}$
42	LOCKWASHER-SPLIT	SAE		4	CAD PL ST	$\frac{1}{4}$
41	CAP SCREW, SOCKET HEAD			3	CAD PL ST	$\frac{1}{4}$-20 x $1\frac{1}{2}$
40	INSTALLATION LAYOUT	CD-MC-5821	REFERENCE			
39	CLAMP SHELL	413057-16	ABE	1		
38	CONNECTOR, CABLE	MS3106A-28-11S	ABE	1		
37	CHASSIS RECEPTACLE	MS3102A-28-11P	ABE	1		
36	CLAMP, BAND		RCH	8	COR RES STEEL	3 x $\frac{1}{2}$
35	WEATHER CASE	PMA? MC-6582	SA	1	HU 365-1	
	RECTANGULAR CASE	HU 365-1	FT	1	ALUMINUM	$7\frac{1}{2}$ x 10 x 14
34	CLAMP	STD-MA-2152	SA	1	STEEL SPR	$\frac{3}{4}$ x $\frac{1}{2}$
33	HUB	STD-MA-2152	SA	1	STEEL SPR	$\frac{3}{4}$ x $\frac{1}{2}$
32	SPRING	STD-MA-2153	SA	1	STEEL WIRE	.25 DIA
31	ABL CLAMP ASSY	STD-MA-2157	REFERENCE			
30	SCREW	62027				
29	BEARING, THRUST	7200E				
28	PULLEY	8.00-22				
27	HOUSING-MOUNTING	405 MB 5032			MOR MB 5031	
	CASTING, BRG HSNG	405 MB 5031				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CONVERSION OF VOLTAGE AND POWER RATIOS TO DECIBELS

The basic chart below indicates the number of decibels (db) corresponding to the listed ratios of voltage or power over the range of −20 to +20 db. For voltage or power ratios greater than those included in the chart, the ratio can be broken down into a product of two numbers, the value in db for each found separately, and the two results added. Example: To convert a power ratio of 2,000:1 to db, express 2,000 as 2×10^3; the number of db corresponding to a power ratio of 2 is very nearly 3, and the number of db for a power ratio of 10^3 is 30. Therefore, the power ratio of 2,000:1 is approximately 30 db + 3 db = 33 db. In the lower right-hand corner of the chart db values for voltage and power ratios of integral powers of 10 are given.

Voltage Ratio	Power Ratio	−db+	Voltage Ratio	Power Ratio	Voltage Ratio	Power Ratio	−db+	Voltage Ratio	Power Ratio	Voltage Ratio	Power Ratio	−db+	Voltage Ratio	Power Ratio
1.000	1.000	0	1.000	1.000	.447	.200	7.0	2.239	5.012	.200	.0398	14.0	5.012	25.12
.989	.977	.1	1.012	1.023	.442	.195	7.1	2.265	5.129	.197	.0389	14.1	5.070	25.70
.977	.955	.2	1.023	1.047	.437	.191	7.2	2.291	5.248	.195	.0380	14.2	5.129	26.30
.966	.933	.3	1.035	1.072	.432	.186	7.3	2.317	5.370	.193	.0372	14.3	5.188	26.92
.955	.912	.4	1.047	1.096	.427	.182	7.4	2.344	5.495	.191	.0363	14.4	5.248	27.54
.944	.891	.5	1.059	1.122	.422	.178	7.5	2.371	5.623	.188	.0355	14.5	5.309	28.18
.933	.871	.6	1.072	1.148	.417	.174	7.6	2.399	5.754	.186	.0347	14.6	5.370	28.84
.923	.851	.7	1.084	1.175	.412	.170	7.7	2.427	5.888	.184	.0339	14.7	5.433	29.51
.912	.832	.8	1.096	1.202	.407	.166	7.8	2.455	6.026	.182	.0331	14.8	5.495	30.20
.902	.813	.9	1.109	1.230	.403	.162	7.9	2.483	6.166	.180	.0324	14.9	5.559	30.90
.891	.794	1.0	1.122	1.259	.398	.159	8.0	2.512	6.310	.178	.0316	15.0	5.623	31.62
.881	.776	1.1	1.135	1.288	.394	.155	8.1	2.541	6.457	.176	.0309	15.1	5.689	32.36
.871	.759	1.2	1.148	1.318	.389	.151	8.2	2.570	6.607	.174	.0302	15.2	5.754	33.11
.861	.741	1.3	1.161	1.349	.385	.148	8.3	2.600	6.761	.172	.0295	15.3	5.821	33.88
.851	.724	1.4	1.175	1.380	.380	.145	8.4	2.630	6.918	.170	.0288	15.4	5.888	34.67
.841	.708	1.5	1.189	1.413	.376	.141	8.5	2.661	7.079	.168	.0282	15.5	5.957	35.48
.832	.692	1.6	1.202	1.445	.372	.138	8.6	2.692	7.244	.166	.0275	15.6	6.026	36.31
.822	.676	1.7	1.216	1.479	.367	.135	8.7	2.723	7.413	.164	.0269	15.7	6.095	37.15
.813	.661	1.8	1.230	1.514	.363	.132	8.8	2.754	7.586	.162	.0263	15.8	6.166	38.02
.804	.646	1.9	1.245	1.549	.359	.129	8.9	2.786	7.762	.160	.0257	15.9	6.237	38.90
.794	.631	2.0	1.259	1.585	.355	.126	9.0	2.818	7.943	.159	.0251	16.0	6.310	39.81
.785	.617	2.1	1.274	1.622	.351	.123	9.1	2.851	8.128	.157	.0246	16.1	6.383	40.74
.776	.603	2.2	1.288	1.660	.347	.120	9.2	2.884	8.318	.155	.0240	16.2	6.457	41.69
.767	.589	2.3	1.303	1.698	.343	.118	9.3	2.917	8.511	.153	.0234	16.3	6.531	42.66
.759	.575	2.4	1.318	1.738	.339	.115	9.4	2.951	8.710	.151	.0229	16.4	6.607	43.65
.750	.562	2.5	1.334	1.778	.335	.112	9.5	2.985	8.913	.150	.0224	16.5	6.683	44.67
.741	.550	2.6	1.349	1.820	.331	.110	9.6	3.020	9.120	.148	.0219	16.6	6.761	45.71
.733	.537	2.7	1.365	1.862	.327	.107	9.7	3.055	9.333	.146	.0214	16.7	6.839	46.77
.724	.525	2.8	1.380	1.905	.324	.105	9.8	3.090	9.550	.145	.0209	16.8	6.918	47.86
.716	.513	2.9	1.396	1.950	.320	.102	9.9	3.126	9.772	.143	.0204	16.9	6.998	48.98
.708	.501	3.0	1.413	1.995	.316	.100	10.0	3.162	10.000	.141	.0200	17.0	7.079	50.12
.700	.490	3.1	1.429	2.042	.313	.0977	10.1	3.199	10.23	.140	.0195	17.1	7.161	51.29
.692	.479	3.2	1.445	2.089	.309	.0955	10.2	3.236	10.47	.138	.0191	17.2	7.244	52.48
.684	.468	3.3	1.462	2.138	.306	.0933	10.3	3.273	10.72	.137	.0186	17.3	7.328	53.70
.676	.457	3.4	1.479	2.188	.302	.0912	10.4	3.311	10.96	.135	.0182	17.4	7.413	54.95
.668	.447	3.5	1.496	2.239	.299	.0891	10.5	3.350	11.22	.133	.0178	17.5	7.499	56.23
.661	.437	3.6	1.514	2.291	.295	.0871	10.6	3.388	11.48	.132	.0174	17.6	7.586	57.54
.653	.427	3.7	1.531	2.344	.292	.0851	10.7	3.428	11.75	.130	.0170	17.7	7.674	58.88
.646	.417	3.8	1.549	2.399	.288	.0832	10.8	3.467	12.02	.129	.0166	17.8	7.762	60.26
.638	.407	3.9	1.567	2.455	.285	.0813	10.9	3.508	12.30	.127	.0162	17.9	7.852	61.66
.631	.398	4.0	1.585	2.512	.282	.0794	11.0	3.548	12.59	.126	.0159	18.0	7.943	63.10
.624	.389	4.1	1.603	2.570	.279	.0776	11.1	3.589	12.88	.125	.0155	18.1	8.035	64.57
.617	.380	4.2	1.622	2.630	.275	.0759	11.2	3.631	13.18	.123	.0151	18.2	8.128	66.07
.610	.372	4.3	1.641	2.692	.272	.0741	11.3	3.673	13.49	.122	.0148	18.3	8.222	67.61
.603	.363	4.4	1.660	2.754	.269	.0724	11.4	3.715	13.80	.120	.0145	18.4	8.318	69.18
.596	.355	4.5	1.679	2.818	.266	.0708	11.5	3.758	14.13	.119	.0141	18.5	8.414	70.79
.589	.347	4.6	1.698	2.884	.263	.0692	11.6	3.802	14.45	.118	.0138	18.6	8.511	72.44
.582	.339	4.7	1.718	2.951	.260	.0676	11.7	3.846	14.79	.116	.0135	18.7	8.610	74.13
.575	.331	4.8	1.738	3.020	.257	.0661	11.8	3.890	15.14	.115	.0132	18.8	8.710	75.86
.569	.324	4.9	1.758	3.090	.254	.0646	11.9	3.936	15.49	.114	.0129	18.9	8.811	77.62
.562	.316	5.0	1.778	3.162	.251	.0631	12.0	3.981	15.85	.112	.0126	19.0	8.913	79.43
.556	.309	5.1	1.799	3.236	.248	.0617	12.1	4.027	16.22	.111	.0123	19.1	9.016	81.28
.550	.302	5.2	1.820	3.311	.246	.0603	12.2	4.074	16.60	.110	.0120	19.2	9.120	83.18
.543	.295	5.3	1.841	3.388	.243	.0589	12.3	4.121	16.98	.108	.0118	19.3	9.226	85.11
.537	.288	5.4	1.862	3.467	.240	.0575	12.4	4.169	17.38	.107	.0115	19.4	9.333	87.10
.531	.282	5.5	1.884	3.548	.237	.0562	12.5	4.217	17.78	.106	.0112	19.5	9.441	89.13
.525	.275	5.6	1.905	3.631	.234	.0550	12.6	4.266	18.20	.105	.0110	19.6	9.550	91.20
.519	.269	5.7	1.928	3.715	.232	.0537	12.7	4.315	18.62	.104	.0107	19.7	9.661	93.33
.513	.263	5.8	1.950	3.802	.229	.0525	12.8	4.365	19.05	.102	.0105	19.8	9.772	95.50
.507	.257	5.9	1.972	3.890	.227	.0513	12.9	4.416	19.50	.101	.0102	19.9	9.886	97.72
.501	.251	6.0	1.995	3.981	.224	.0501	13.0	4.467	19.95	.100	.0100	20.0	10.000	100.00
.496	.246	6.1	2.018	4.074	.221	.0490	13.1	4.519	20.42		10^{-3}	30		10^3
.490	.240	6.2	2.042	4.169	.219	.0479	13.2	4.571	20.89	10^{-2}	10^{-4}	40	10^2	10^4
.484	.234	6.3	2.065	4.266	.216	.0468	13.3	4.624	21.38		10^{-5}	50		10^5
.479	.229	6.4	2.089	4.365	.214	.0457	13.4	4.677	21.88	10^{-3}	10^{-6}	60	10^3	10^6
.473	.224	6.5	2.113	4.467	.211	.0447	13.5	4.732	22.39		10^{-7}	70		10^7
.468	.219	6.6	2.138	4.571	.209	.0437	13.6	4.786	22.91	10^{-4}	10^{-8}	80	10^4	10^8
.462	.214	6.7	2.163	4.677	.207	.0427	13.7	4.842	23.44		10^{-9}	90		10^9
.457	.209	6.8	2.188	4.786	.204	.0417	13.8	4.898	23.99	10^{-5}	10^{-10}	100	10^5	10^{10}
.452	.204	6.9	2.213	4.898	.202	.0407	13.9	4.955	24.55		10^{-11}	110		10^{11}
										10^{-6}	10^{-12}	120	10^6	10^{12}

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